LINEAR ENHANCEMENTS OF THE STREAMLINE DIFFUSION METHOD FOR CONVECTION-DIFFUSION PROBLEMS

Neil Madden and Martin Stynes

Several computationally simple modifications of the streamline diffusion finite element method are developed for linear convection-dominated convection-diffusion problems in two dimensions. Numerical experiments show that these modifications yield significantly more accurate results than are attainable from the basic streamline diffusion method. Full details appear in [1].

Reference

[1] N. Madden and M. Stynes, *Linear enhancements of the streamline diffusion method for convection-diffusion problems*, Computers Math. Applic. **32** (1996), 29-42.

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A UNIFORMLY CONVERGENT GALERKIN METHOD ON A SHISHKIN MESH FOR A CONVECTION-DIFFUSION PROBLEM

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A Galerkin finite element method that uses piecewise bilinears on a simple piecewise equidistant mesh is applied to a linear convection-dominated convection-diffusion problem in two dimensions. The method is shown to be convergent, uniformly in the perturbation parameter, of order $N^{-1} \ln N$ in a global energy norm and of order $N^{-1/2} \ln^{3/2} N$ pointwise near the outflow boundary, where the total number of mesh points is $O(N^2)$. Full details appear in [1].

Reference

[1] M. Stynes and E. O'Riordan, *A uniformly convergent Galerkin method on a Shishkin mesh for a convection-diffusion problem* (1996) (Preprint 1996–6, Department of Mathematics, University College Cork.)

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